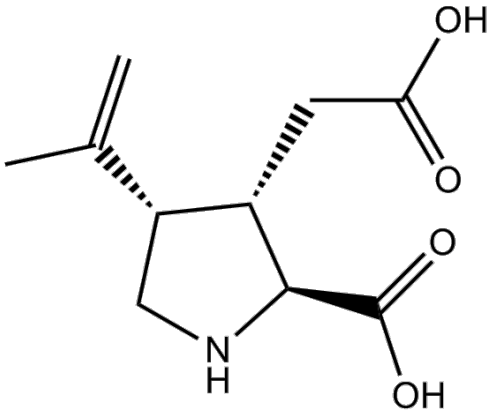
Product Data Sheet

Product Name: Kainic acid
Cat. No.: GC16667

Chemical Properties

Cas. No.	487-79-6		
Chemical Name	(2S,3S,4S)-3-(carboxymethyl)-4-(prop-1-en-2-yl)pyrrolidine-2-carboxylic acid		
SMILES	OC([C@H]1NC[C@H](C(C)=C)[C@@H]1CC(O)=O)=O		
Formula	$C_{10}H_{15}NO_4$	M.Wt	213.23
Solubility	≥ 11.05mg/mL in Water with gentle warming	Storage	Store at -20°C
General tips	For obtaining a higher solubility , please warm the tube at 37 °C and shake it in the ultrasonic bath for a while.Stock solution can be stored below -20°C for several months.		
Shipping Condition	Evaluation sample solution : ship with blue ice All other available size: ship with RT , or blue ice upon request.		

Structure



Protocol

Cell experiment [1]:

Cell lines Neuron

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Preparation Method	To induce excitotoxicity in the cortical neuronal cultures 50 µL of conditioned media containing kainic acid was added to culture wells containing 50 µL of conditioned media (200 µM final kainic acid concentration). Cultures were incubated at 37°C in the CO2 incubator for 45 min for kainic acid, after which time the media was replaced with 100 µL of 50% NB/2% N2 and 50% balance salt solution (NB/N2:BSS).
Reaction Conditions	200 µM;45 min
Applications	Acute exposure of neurons to kainic acid induces cell death.

Animal experiment [2]:

Animal models	C57BL/6 mice
Preparation Method	Kainic Acid was dissolved in phosphate buffered saline (pH 7.4) at a concentration of one mg/ml and aliquoted, frozen, and stored at 80 °C. On the day of infusion, an aliquot was removed from the freezer and allowed to come to room temperature prior to infusion; unused excess was discarded. Phosphate buffered saline (PBS) served as vehicle. Five units of heparin were added to every one ml of PBS and one ml of KA. Mice were gently restrained and either KA or PBS solutions infused into lateral tail vein via a 30 gauge needle at an infusion rate of 70 µl/min using a syringe pump.
Dosage form	70 µl/min; 16 mg/kg;i.v
Applications	Intravenous infusion of KA reliably induces status epilepticus (SE).

References:

[1]. Meade AJ, Meloni BP, et,al. AP-1 inhibitory peptides attenuate in vitro cortical neuronal cell death induced by kainic acid. Brain Res. 2010 Nov 11;1360:8-16. doi: 10.1016/j.brainres.2010.09.007. Epub 2010 Sep 15. PMID: 20833150.
[2]. Drysdale ND, Matthews E, et,al. Intravenous kainic acid induces status epilepticus and late onset seizures in mice. Epilepsy Res. 2021 Dec;178:106816. doi: 10.1016/j.eplepsyres.2021.106816. Epub 2021 Nov 14. PMID: 34808484; PMCID: PMC8657370.

Background

Kainic acid (KA), is an analog of the excitotoxic neurotransmitter glutamate. Kainic acid induces seizures[1-3].

Kainic acid(200 μM; 45 min) exposure induced caspase and calpain activation in neuronal cultures[4]. Kainic acid(5 μM) induces seizure-like activity in cortical human neurons[5]. Treatments with KA(1-100 μM) resulted in a significant decrease in cell viability in primary cultures of hippocampal neurons [6].

KA-induced(10 mg/kg;i.p) excitotoxicity led to sustained hyperphosphorylation of tau in MAPT transgenic (Tg) mice. This can lead to memory deficits[7]. After 1.0 μg of Kainic acid was injected into the hippocampus of young mice at 6, 7 and 9 days of age, pyramidal cells died significantly [8]. Injection of Kainic acid(70 μl/min; 16 mg/kg;i.v) through the tail vein of a mouse reliably and rapidly induces status epilepticus (SE) which remits spontaneously and leads to the development of temporal lobe epilepsy (TLE) in a subset of mice[9].

References:
[1]. LÉvesque M, Avoli M. The kainic acid model of temporal lobe epilepsy. Neurosci Biobehav Rev. 2013 Dec;37(10 Pt 2):2887-99. doi: 10.1016/j.neubiorev.2013.10.011. Epub 2013 Oct 30. PMID: 24184743; PMCID: PMC4878897.
[2]. Ben-Ari Y, Cossart R. Kainate, a double agent that generates seizures: two decades of progress. Trends Neurosci. 2000 Nov;23(11):580-7. doi: 10.1016/s0166-2236(00)01659-3. PMID: 11074268.
[3]. Barker-Haliski M, White HS. Glutamatergic Mechanisms Associated with Seizures and Epilepsy. Cold Spring Harb Perspect Med. 2015 Jun 22;5(8):a022863. doi: 10.1101/cshperspect.a022863. PMID: 26101204; PMCID: PMC4526718.

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[4]. Meade AJ, Meloni BP, et,al. AP-1 inhibitory peptides attenuate in vitro cortical neuronal cell death induced by kainic acid. Brain Res. 2010 Nov 11;1360:8-16. doi: 10.1016/j.brainres.2010.09.007. Epub 2010 Sep 15. PMID: 20833150.
[5]. Mzezewa R, Lotila J, et,al. A kainic acid-induced seizure model in human pluripotent stem cell-derived cortical neurons for studying the role of IL-6 in the functional activity. Stem Cell Res. 2022 Apr;60:102665. doi: 10.1016/j.scr.2022.102665. Epub 2022 Jan 17. PMID: 35091307.
[6]. RodrÍguez-ChÁvez V, Flores-Soto E, et,al. Prolactin reduces the kainic acid-induced increase in intracellular Ca2+ concentration, leading to neuroprotection of hippocampal neurons. Neurosci Lett. 2023 Jul 27;810:137344. doi: 10.1016/j.neulet.2023.137344. Epub 2023 Jun 13. PMID: 37315731.
[7]. Zheng XY, Lv YD, et,al. Kainic acid hyperphosphorylates tau via inflammasome activation in MAPT transgenic mice. Aging (Albany NY). 2019 Dec 2;11(23):10923-10938. doi: 10.18632/aging.102495. Epub 2019 Dec 2. PMID: 31789603; PMCID: PMC6932880.
[8]. Cook TM, Crutcher KA. Intrahippocampal injection of kainic acid produces significant pyramidal cell loss in neonatal rats. Neuroscience. 1986 May;18(1):79-92. doi: 10.1016/0306-4522(86)90180-6. PMID: 3736859.
[9]. Drysdale ND, Matthews E, et,al. Intravenous kainic acid induces status epilepticus and late onset seizures in mice. Epilepsy Res. 2021 Dec;178:106816. doi: 10.1016/j.eplepsyres.2021.106816. Epub 2021 Nov 14. PMID: 34808484; PMCID: PMC8657370.

Caution: Product has not been fully validated for medical applications. For research use only.
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